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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,698	07/14/2006	Masanori Sakai	1592-0178PUS1	9561
2292 7590 02/12/2009 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
EXAMINER				
CHEN, KEATH T				
ART UNIT		PAPER NUMBER		
1792				
NOTIFICATION DATE		DELIVERY MODE		
02/12/2009		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/549,698

Applicant(s)

SAKAI ET AL.

Examiner

KEATH T. CHEN

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE-08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 01/14/2009 has been entered.

Response to Amendment

1. Applicant amendment of the claims, filed on 01/14/2009, in response to the rejection of claims 1-10 in the final office action mailed on 10/15/2008, by amending claims 1, 4, 9, and 10 is acknowledged and will be addressed below.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35 U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-2 and 4-9 are rejected under 35 U.S.C. 102(b) as being anticipated under Seelback et al. (US 4699805, hereafter '805).

'805 teaches all limitations of:

Claims 1 and 4: A substrate processing apparatus (Fig. 1) comprising: a processing chamber (#14, col. 4, line 61) which accommodates substrates (#30s, col. 5, lines 5-6) therein, a heating member (#16, col.41, lines 62-64) which heats said substrates, gas supply to supply a first gas (any of #36, #38, #40, or #42) to the process

chamber through a first supply tube (#62 and its upstream) and, alternately, at least one controller (MFCs not shown, that controls #36-42, col. 5, lines 48-54; and MFCs #58 and #52, col. 5, lines 22-34), said controller controlling gas supply to supply a first gas (any of #36-42) to the process chamber through a first supply tube (#62) between the at least one controller and the process chamber and, alternately, to supply a second gas (#32 or #34, gases as labeled, col. 5, lines 22-34) to the process chamber through a second supply tube (#50 and its upstream) between the at least one controller and the process chamber independent of the first tube, a single gas supply member (#12 #44, #94 and #24, together, as a single member having two injection tubes connected by spacer #94 as shown in Fig. 2) which supplies said first and second gases into said processing chamber and which has a portion (right hand side of the #12, #44, #94 and #24, between heater coil #16) extending to a region whose temperature is equal to or higher than a decomposition temperature of at least one of said two gases (heater is capable be adjusted to any suitable temperature for decomposition of gas) the first supply tube (#62 and its upstream) including, a first mass controller (MFCs not shown, that controls #36-42, col. 5, lines 48-54), the second supply tube (#50 and its upstream) including a second mass controller (MFCs #58 and #52, col. 5, lines 22-34) and a heater (#50 is heated, col. 5, lines 38-39) between the second mass controller and the single gas supply member, wherein said first and second supply tubes are each individually (as shown in Fig. 1) connected to said gas supply member at a location (close to end cap #20) whose temperature is lower (end cap is away from heater #16) than the decomposition temperature of said first gas or said second gas, and said first

and second gases are supplied into said processing chamber through said gas supply member.

Claim 9 (besides claim 1 limitations): A substrate processing apparatus (Fig. 1) comprising a hot wall type processing furnace (heater #16 heating on the chamber wall) which includes a processing chamber (#14) which accommodates substrates (#30s) therein, a heating member (#16) which is disposed outside of said processing chamber (#16 is outside of #14) and which heats said substrates (#30s).

Claim 4: The description of the first and second supply tubes for claim 1 above meets the requirements of claim 4 as to the "two supply tubes".

Applicant's claim requirement "two gases which react with each other" is considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Claim 2: said gas supply member is a nozzle having a plurality of gas injection openings (#88 and #90 as shown in Fig. 2).

Claim 5: a film produced by reaction of said first and second gases is adhered to an inner wall of said gas supply member (a film is capable of forming inside the gas supply member either by choosing the reaction gases or by setting the temperature).

Claim 6: said controller (MFCs not shown, that controls #36-42, col. 5, lines 48-54; and MFCs #58 and #52, col. 5, lines 22-34) supplies a cleaning gas (H₂ and HN₃ are cleaning gases, in addition, this is intended use) is supplied into said processing chamber through said gas supply member to carry out a cleaning operation of said processing chamber and a removing operation of said film adhered to said gas supply member.

Applicant's claim requirement "supplies a cleaning gas", the gas identity is considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Claims 7 (similarly claim 8): one of said first gas and said second gas is trimethyl aluminum and the other of said first gas and second gas is ozone, and an aluminum oxide film or films are formed on a surface or surfaces of said substrates.

Applicant's claim requirements as to the supplied gas identities and applied film and "substrate" are considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35 U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al. (US 5252133, hereafter '133), in view of Seelback et al. (US 4699805, hereafter '805).

'133 teaches some limitations of:

Claim 1: A substrate processing apparatus (Fig. 1) comprising: a processing chamber (#10, col. 1, line 18) which accommodates substrates (#20s, col. 1, line 27) therein, a heating member (#19, col. 1, line 23) which heats said substrates, gas supply to supply a first gas to the process chamber through a first supply tube and, alternately, to supply a second gas to the process chamber through a second supply tube

independent of the first tube, a single gas supply member (#30', col. 4, lines 4-7) which supplies said first and second gases into said processing chamber and which has a portion extending to a region whose temperature is equal to or higher than a decomposition temperature of at least one of said two gases (heater is capable be adjusted to any suitable temperature for decomposition of gas), wherein said first and second supply tubes are each individually (as shown in Fig. 1) connected to said gas supply member at a location (proximal end, col. 4, lines 4-7) whose temperature is lower (proximal end below heater #19) than the decomposition temperature of said first gas or said second gas, and said first and second gases are supplied into said processing chamber through said gas supply member.

'133 does not teach the other limitations of:

Claim 1: at lease one controller, said controller controlling gas supply (to supply a first gas to the process chamber through a first supply tube) between the at least one controller and the process chamber and, (alternately, to supply a second gas to the process chamber through a second supply tube) between the at least one controller and the process chamber (independent of the first tube), the first supply tube including, a first mass controller, the second supply tube including a second mass controller and a heater between the second mass controller and the single gas supply member.

'805 is an analogous art in the field of CVD apparatus with stacked substrates (abstract), particularly in solving the problem of uniformity (col. 3, lines 36-38; similar to

'133, col. 2, lines 62-65, and Fig. 7). '905 teaches mass flow controller to each of the gas supply and a heater in the high molecular weight material (WF6 and TiCl₄, col. 5, lines 8-10) supply line to increase flow rate (col. 5, lines 38-39).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '805 with '133. Specifically, by adding MFC to each gas supply and a heater to a gas line, as taught by '805, to the apparatus in Fig. 1 of '133, for the purpose/motivation of increase flow rate, as taught by '805 (col. 5, lines 38-39), particularly when operating on high molecular weight material. The motivation to add MFC is to control flow rate, a common knowledge in the art.

'133 also teaches the limitations of:

Claim 9 (besides the limitations of claim 1): A substrate processing apparatus (Fig. 1) comprising a hot wall type processing furnace (heater #19 heating on the chamber wall) which includes a processing chamber (#10) which accommodates substrates (#20s) therein, a heating member (#19) which is disposed outside of said processing chamber (#19 is outside of #10) and which heats said substrates.

'133 does not teach the other limitations of:

Claim 9: at least one controller, said controller controlling gas supply (to supply a first gas to the process chamber through a first supply tube) between the at least one controller and the process chamber and, (alternately, to supply a second gas to the

process chamber through a second supply tube) between the at least one controller and the process chamber (independent of the first tube), the first supply tube including, a first mass controller, the second supply tube including a second mass controller and a heater between the second mass controller and the single gas supply member.

For substantially the same reason as discussed above, '805 teaches the other limitations of claim 9.

'133 also teaches the limitations of:

Claim 4 (besides claim 1 limitations): in which at least two gases which react with each other (intended use) are alternately supplied into said processing chamber to form a desired film or films (col. 1, lines 50-51) on a surface or surfaces of said substrates, comprising: two supply tubes (#221 and #222).

Applicant's claim requirement "two gases which react with each other are alternately supplied ..." is considered intended use in the pending apparatus claims. See discussion above.

'133 does not teach the other limitations of:

Claim 4: alternately supplied into said processing chamber by a controller, the two supply tubes including a first mass controller and a second mass controller, and one of the two supply tubes including a heater between the first or second mass controller

and said single gas supply member, said two gases are alternately supplied by said controller.

For substantially the same reason as discussed above, '805 teaches the other limitations of claim 4.

'133 further teaches the limitations of:

Claim 2: said gas supply member is a nozzle having a plurality of gas injection openings (injection holes #34, col. 4, line 22).

Claim 3: a reaction tube (tube #12, col. 1, line 16) which forms said processing chamber and which can accommodate a plurality of stacked substrates therein (#20s, col. 1, lines 26-28), wherein said nozzle extends from a lower portion to an upper portion of said reaction tube along a direction in which said substrates are stacked (as shown in Fig. 1).

Claim 5: a film produced by reaction of said first and second gases is adhered to an inner wall of said gas supply member (a film is capable of forming inside the gas supply member either by choosing the reaction gases or by setting the temperature).

Claim 6: said controller (imported from '805) supplies a cleaning gas (any of #221 or #222, in addition, this is intended use) is supplied into said processing chamber through said gas supply member to carry out a cleaning operation of said processing chamber and a removing operation of said film adhered to said gas supply member.

Applicant's claim requirement "supplies a cleaning gas", the gas identity is considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Claims 7 (similar for claim 8): one of said first gas and said second gas is trimethyl aluminum and the other of said first gas and second gas is ozone, and an aluminum oxide film or films are formed on a surface or surfaces of said substrates.

Applicant's claim requirements as to the supplied gas identities and applied film and "substrate" are considered intended use in the pending apparatus claims. See intended use discussion above.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over '133 and '805, further in view of Raaijmakers et al. (US 20010024387, hereafter '387).

For substantially the same reason as in 35 USC 103 rejection of claim 1 rejection above, '133 and '805 teach an apparatus which has every limitation of the apparatus, including two supply tubes extending into the process chamber, of in the preamble of claim 10, as discussed above.

'805 does not teach the method of claim 10:

The method comprising the steps of: supplying a first one of said two gases to the single gas supply member through a first one of said two supply tubes for a first period of time; and after said first period of time, alternately supplying a second one of said two gases to the single gas supply member through a second one of said two supply tubes for a second period of time to form a film on said substrate or substrates.

'387 is an analogous art in the field of CVD ([0012], last sentence, and '757, lines 11-16), particularly to overcome the shortcoming of the conventional CVD processes ([0013], lines 3-5). '387 teaches the ALD method of forming film by supplying a first one of said two gases (metal source gas, Fig. 5) for a first period of time (as indicated in the time axis of Fig. 5) to form a film (see, for example, [0045]) on said substrate or substrates; and after said first period of time, supplying a second one of said two gases (oxygen source gas) for a second period of time to form a film on said substrate or substrates, for the benefit of "the resultant metal-containing monolayer is desirably self-terminating, such that any excess constituents of the first chemistry do not further react with the monolayer formed by this process" ([0055], lines 8-11). '387 further teaches the use of the same chamber ([0049], for example) for ALD, and to modifying different chamber to ALD processes ([0085]).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '387 with '805, by applying the process taught by '387 in the apparatus provided by '805 to execute the processing sequence.

The motivation to combine would have been self-terminating monolayer growth, as taught by '387 ([0055], lines 8-11).

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over '805, further in view of '387.

For substantially the same reason as in 35 USC 102 rejection of claim 1 rejection based on '805 above and the combination with '387 above, claim 10 is also rejected in '805 and '387 combination.

Response to Arguments

Applicant's arguments filed 01/14/2009 have been fully considered but they are unconvincing in light of new ground of rejections to address the new claim limitations.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 6:30AM-3 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KEATH T CHEN/
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792